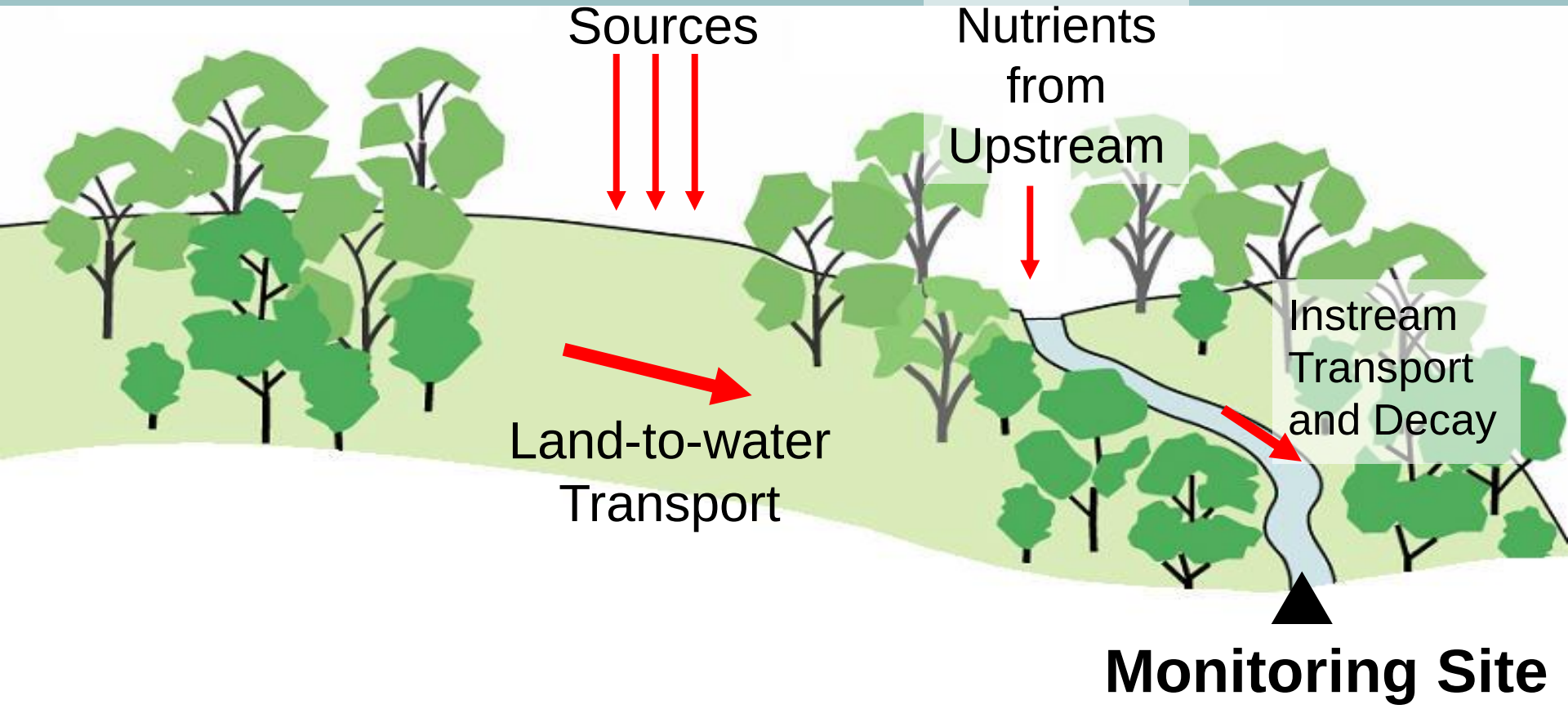
A Web-Based Tool for Evaluating Surface-Water Nutrient Conditions using the USGS SPARROW Model

Daniel Wise, Hydrologist
US Geological Survey
Portland, OR

SPARROW* relates monitoring data to information on watershed characteristics and nutrient sources



*SPAtially Referenced Regressions On Watershed Attributes

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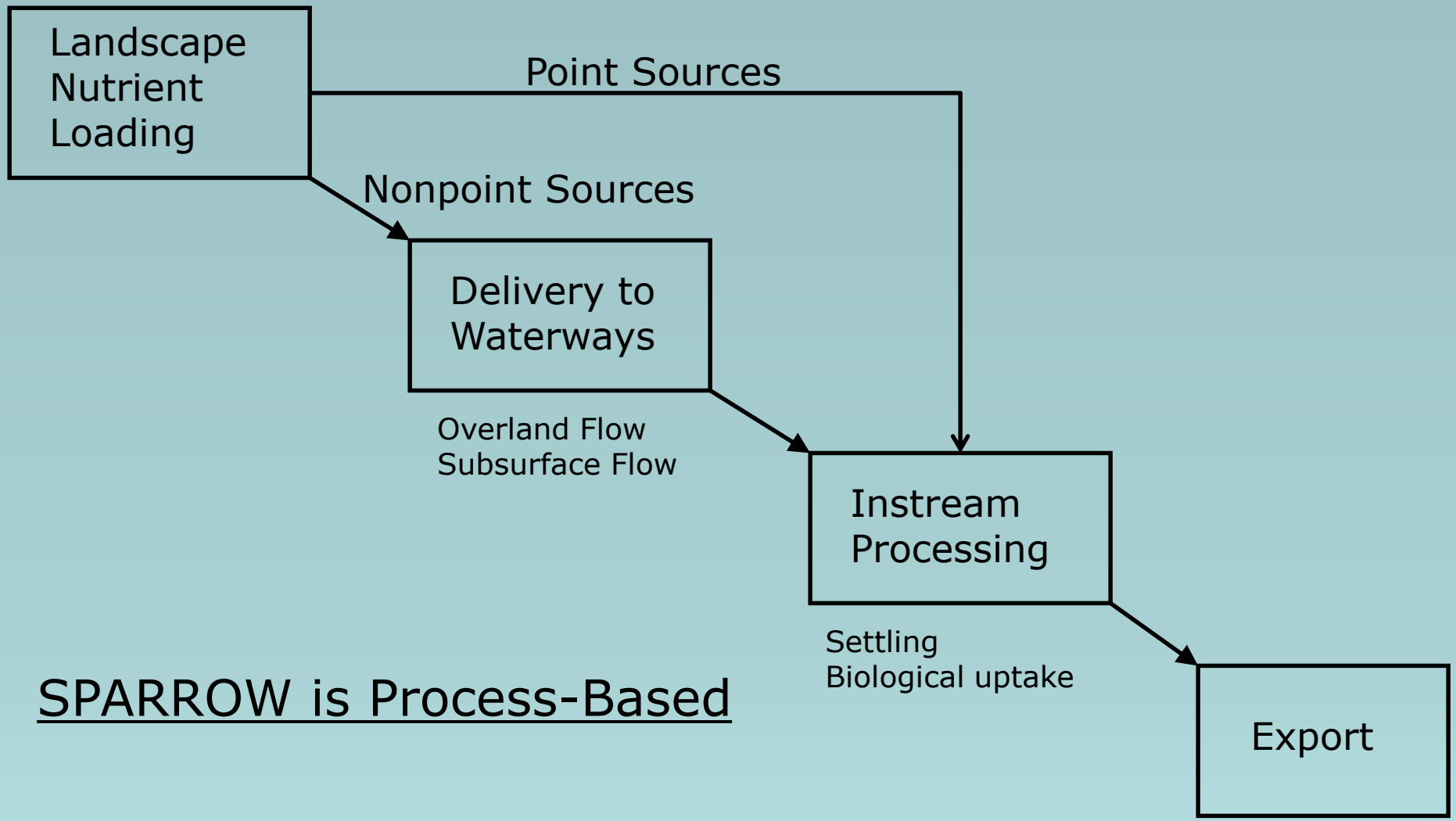
SPARROW Model Description



SPARROW is Process-Based

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SPARROW Model Description

SPARROW Regression Equation

$$\text{Load}_i = \left\{ \sum_{j \in J(i)} \left[\sum_{n=1}^{N} S_{n,j} \underbrace{\beta_n \exp(-\alpha' Z_j)}_{\text{Land-to-Water Delivery}} \right] \underbrace{\exp(-\delta' T_{i,j})}_{\text{Instream Processing}} \right\} \underbrace{\exp(\epsilon_i)}_{\text{Error}}$$

Sources

Land-to-Water Delivery

Instream Processing

Error

SPARROW Predictions are Statistically Derived

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SPARROW extrapolates calibration results for monitored watersheds to all locations throughout a region

USGS

Nutrient Sources Explicitly Considered in the Pacific Northwest SPARROW Models

Point Sources

WWTP's

Fish Hatcheries

Industrial Facilities

Nonpoint Sources

Farm Fertilizer

Livestock Waste

Developed Land (mostly fertilizer)

Atmospheric N Deposition

Forest Land (N fixation)

Red Alder Trees (N fixation)

Geologic Phosphorus

USGS

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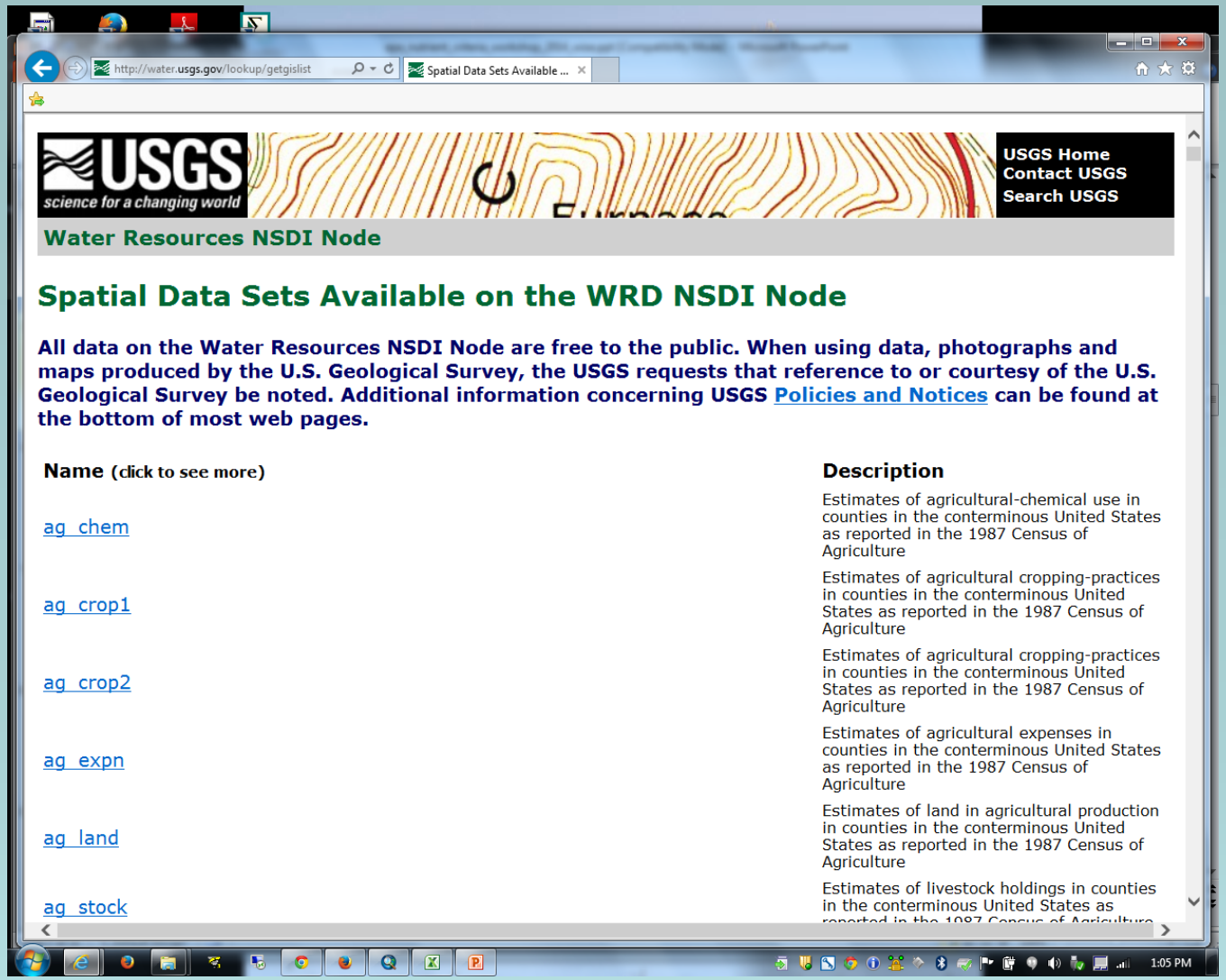
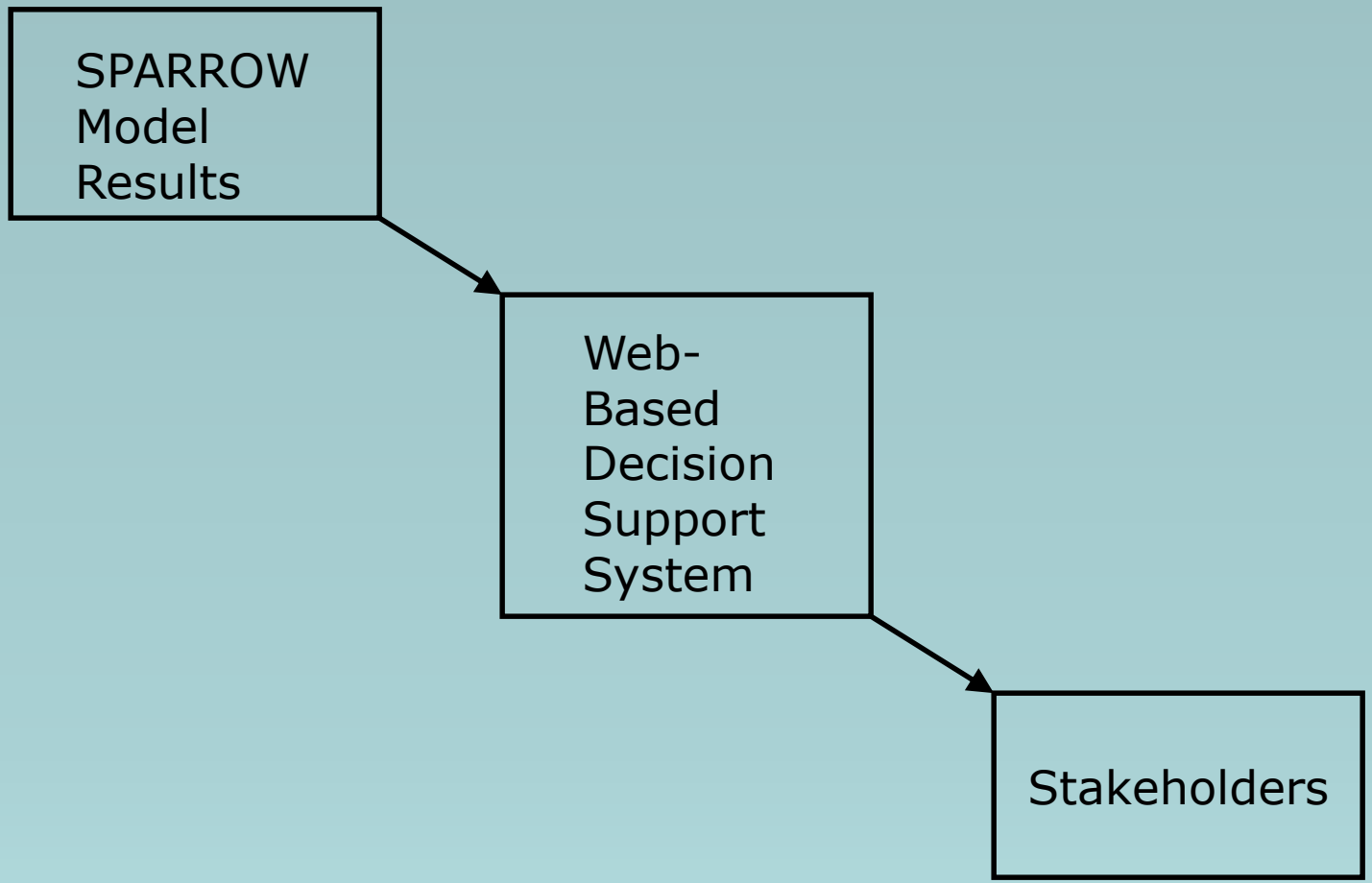


Nutrient sources and other landscape data available in raster and vector format from USGS WRD NSDI Node

SPARROW Decision Support System



SPARROW Decision Support System

- **Predict water-quality conditions where no water-quality data are available**
- **Predict contaminant delivery by source type and location**
- **Predict changes in water-quality conditions under different management scenarios**

SPARROW Decision Support System

http://water.usgs.gov/nawqa/sparrow/dss

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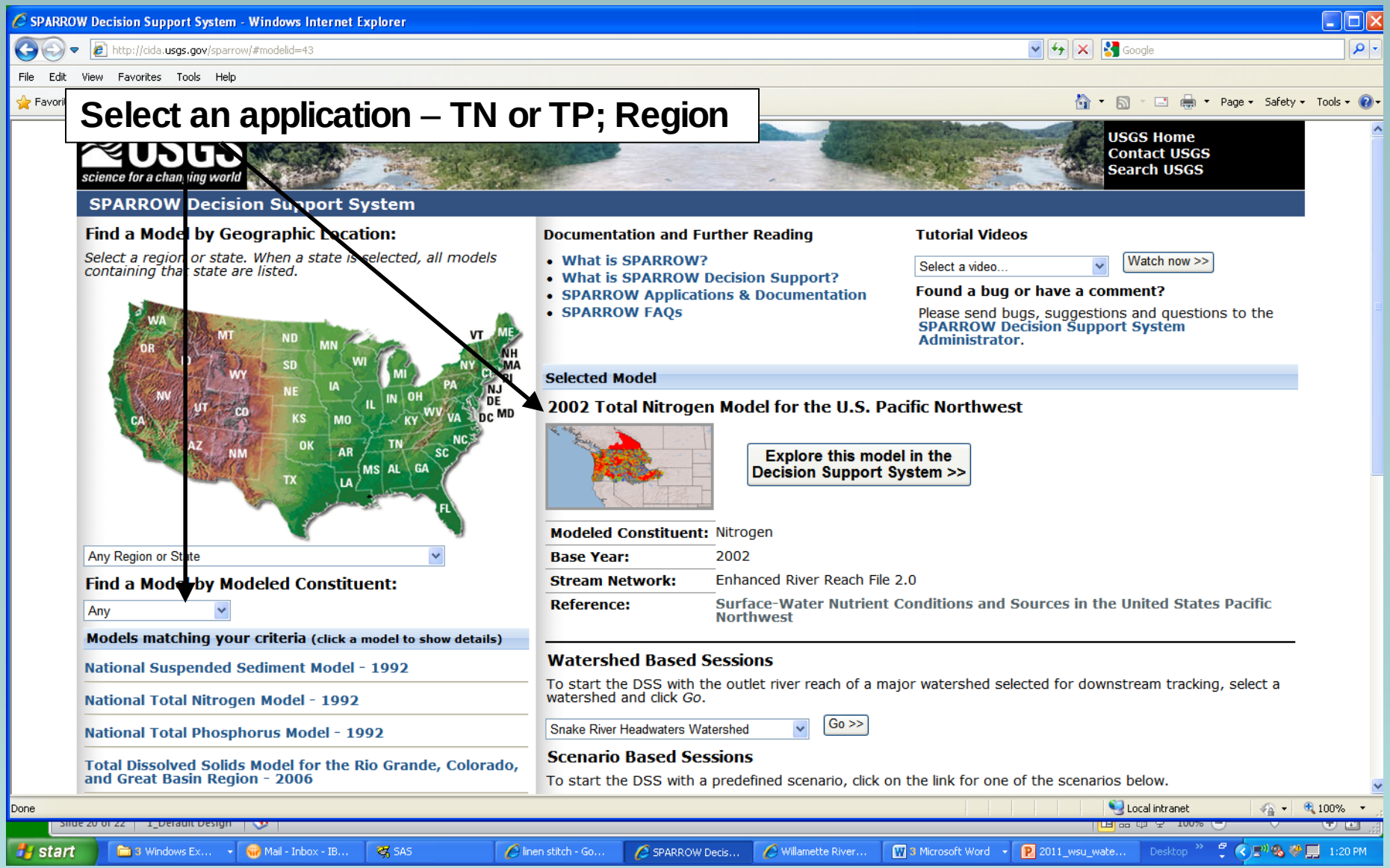
SPARROW Decision Support System



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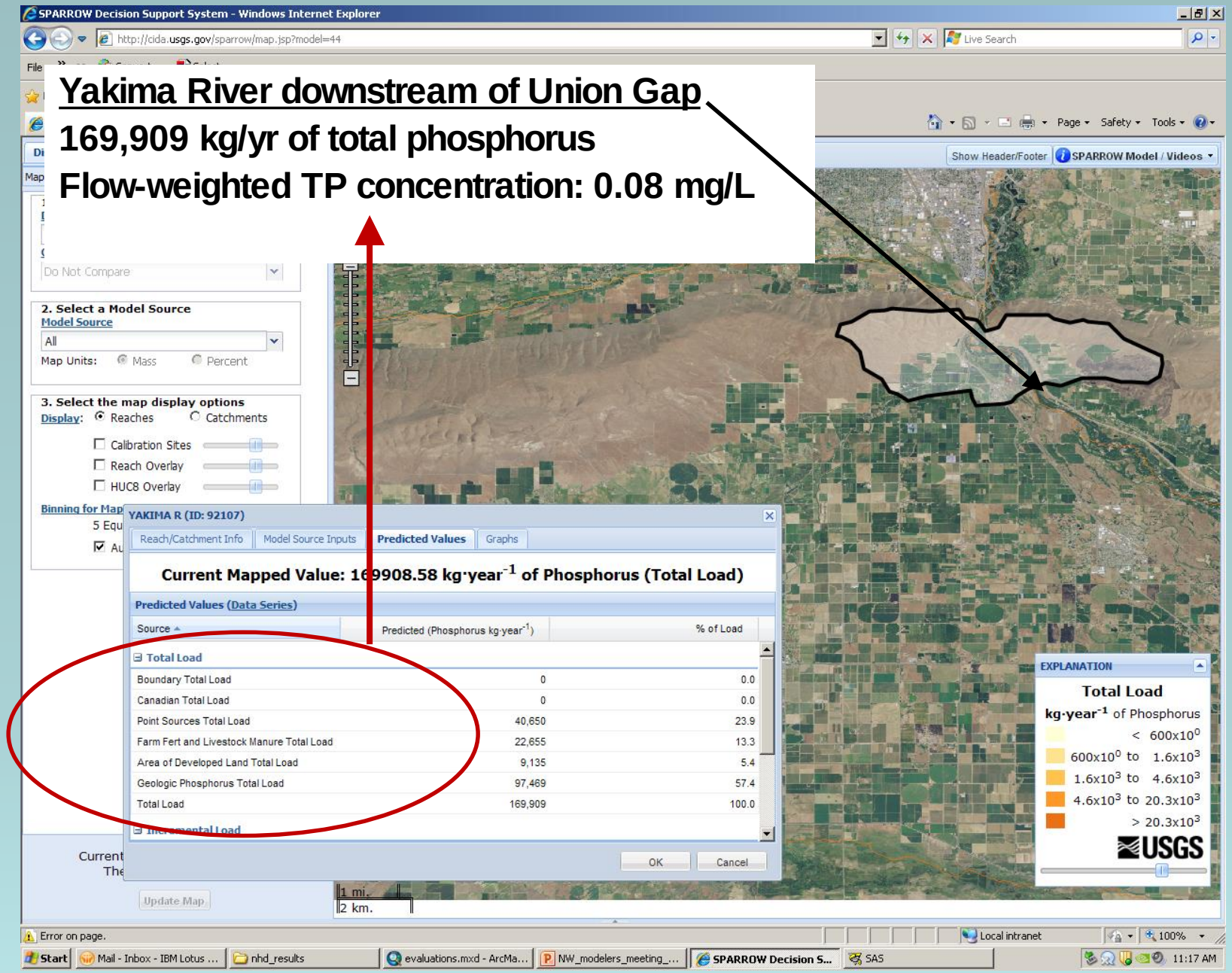
Predicting Water-Quality Conditions



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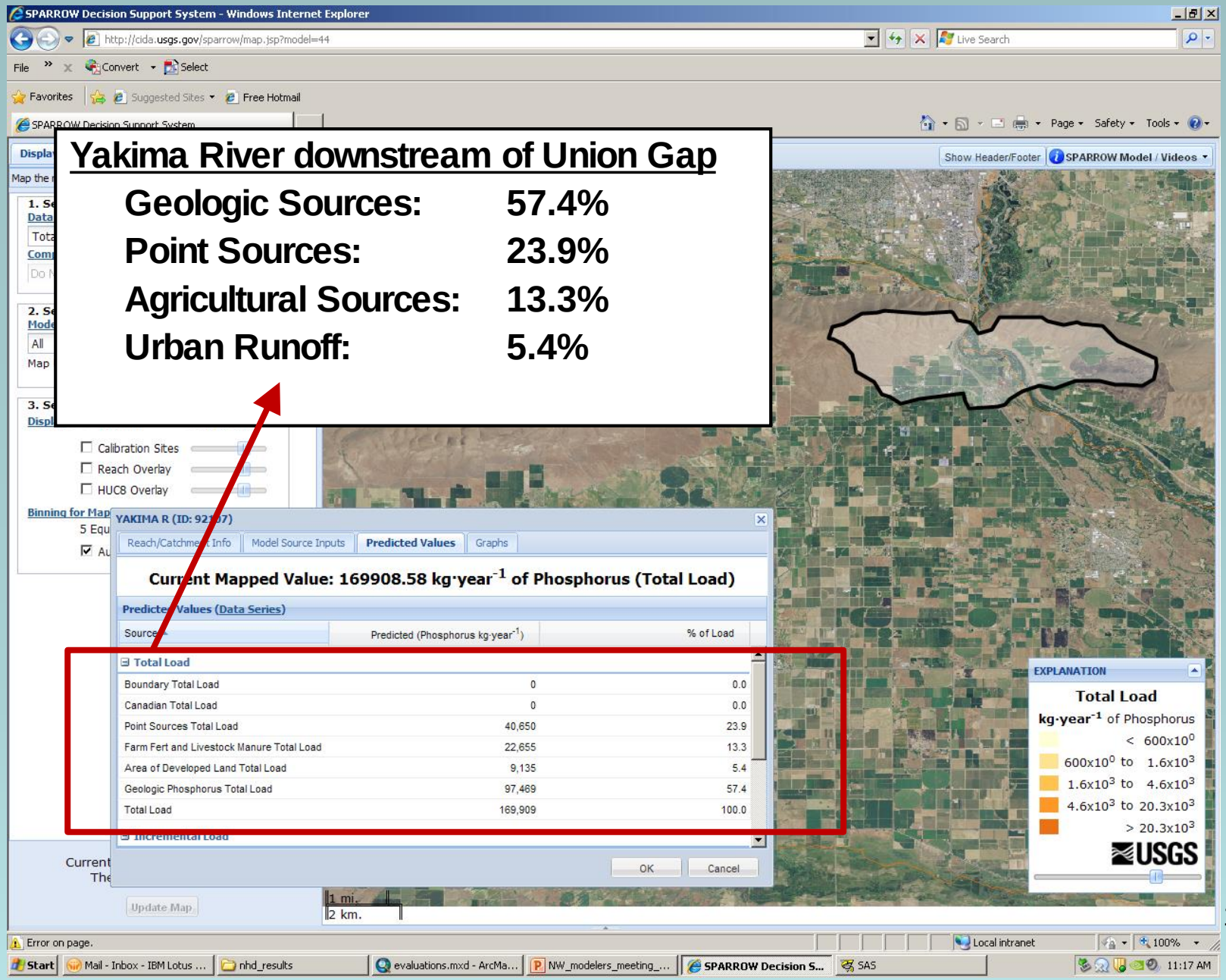
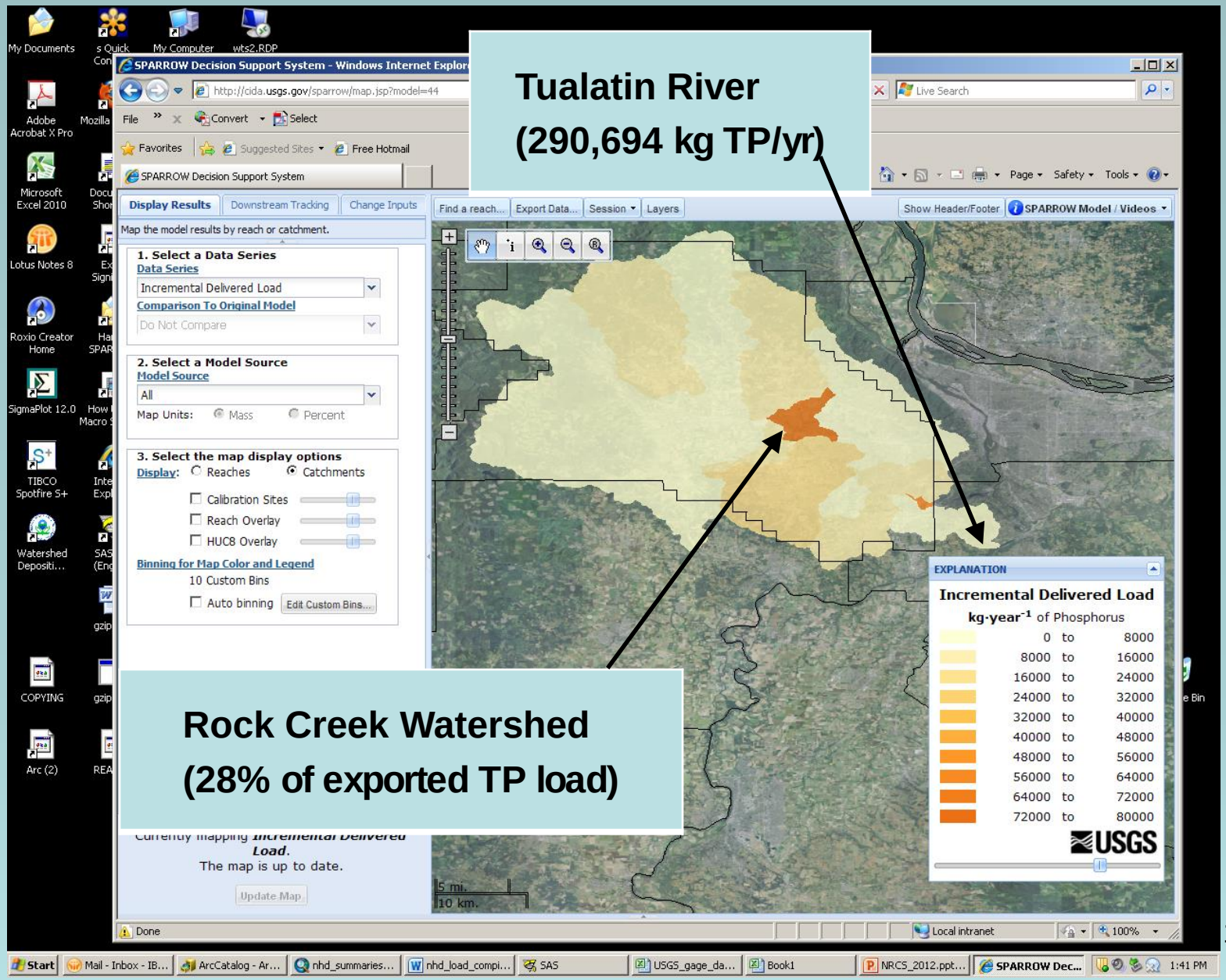


Delivery to Downstream Waters



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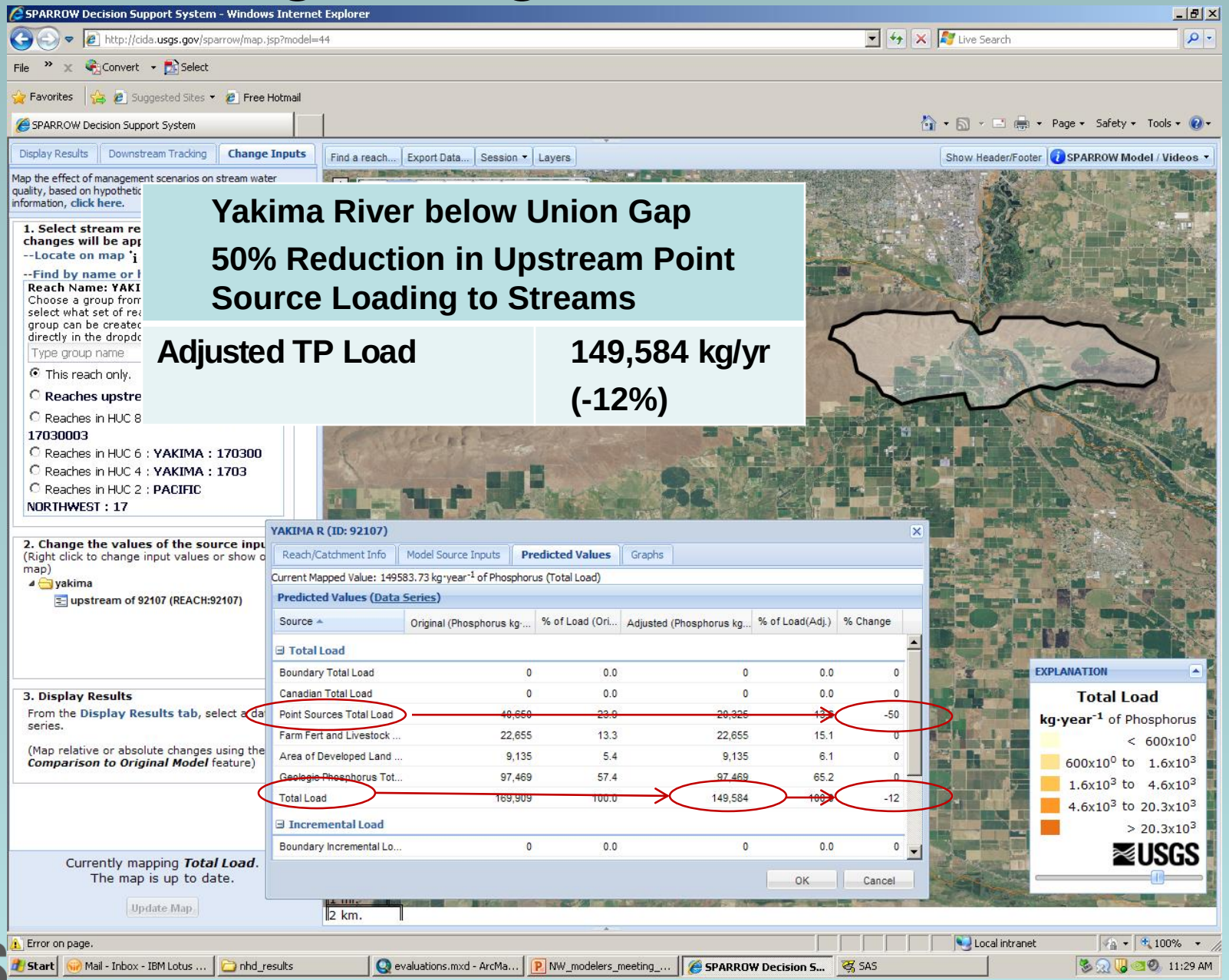
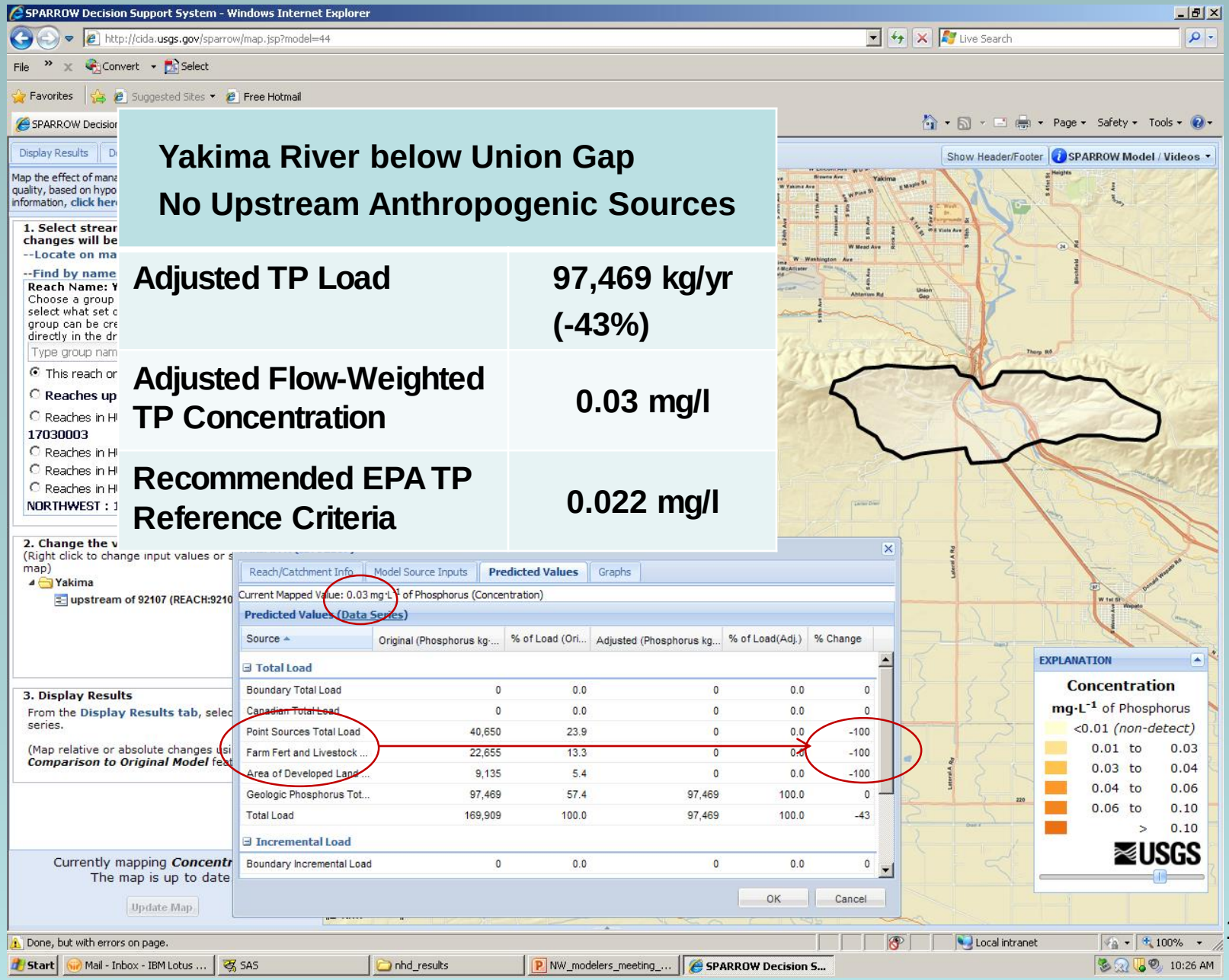
Running Management Scenarios



Running Management Scenarios



Other SPARROW Nutrient Models

- **United States National Models**
- **U.S. Major River Basins**

USGS

How can I get more information?

- SPARROW Information:
  http://water.usgs.gov/nawqa/sparrow/
- PNW Regional Models:
  http://water.usgs.gov/nawqa/sparrow/mrb/7.html
- Decision Support System
  http://water.usgs.gov/nawqa/sparrow/dss/
- Contact:
  Daniel Wise (dawise@usgs.gov)
  503-251-3213

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